be exceeded. This must be shown by energy absorption tests except that analysis based on tests conducted on a landing gear system with identical energy absorption characteristics may be used for increases in previously approved takeoff and landing weights.

(b) The landing gear may not fail, but may yield, in a test showing its reserve energy absorption capacity, simulating a descent velocity of 1.2 times the limit descent velocity, assuming wing lift equal to the weight of the airplane.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23–23, 43 FR 50593, Oct. 30, 1978; Amdt. 23–49, 61 FR 5166, Feb. 9, 1996]

§ 23.725 Limit drop tests.

(a) If compliance with § 23.723(a) is shown by free drop tests, these tests must be made on the complete airplane, or on units consisting of wheel, tire, and shock absorber, in their proper relation, from free drop heights not less than those determined by the following formula:

h (inches)$=3.6\ (W/S)^{1/2}$

However, the free drop height may not be less than 9.2 inches and need not be more than 18.7 inches.

(b) If the effect of wing lift is provided for in free drop tests, the landing gear must be dropped with an effective weight equal to

$$W_e = W\frac{\left[h+(1-L)d\right]}{(h+d)}$$

where—

W_e=the effective weight to be used in the drop test (lbs.);

h=specified free drop height (inches);

d=deflection under impact of the tire (at the approved inflation pressure) plus the vertical component of the axle travel relative to the drop mass (inches);

$W=W_M$ for main gear units (lbs), equal to the static weight on that unit with the airplane in the level attitude (with the nose wheel clear in the case of nose wheel type airplanes);

$W=W_T$ for tail gear units (lbs.), equal to the static weight on the tail unit with the airplane in the tail-down attitude;

$W=W_N$ for nose wheel units lbs.), equal to the vertical component of the static reaction that would exist at the nose wheel, assuming that the mass of the airplane acts at the center of gravity and exerts a force of 1.0 g downward and 0.33 g forward; and

L= the ratio of the assumed wing lift to the airplane weight, but not more than 0.667.

(c) The limit inertia load factor must be determined in a rational or conservative manner, during the drop test, using a landing gear unit attitude, and applied drag loads, that represent the landing conditions.

(d) The value of d used in the computation of W_e in paragraph (b) of this section may not exceed the value actually obtained in the drop test.

(e) The limit inertia load factor must be determined from the drop test in paragraph (b) of this section according to the following formula:

$$n = n_j\frac{W_e}{W} + L$$

where—

n_j=the load factor developed in the drop test (that is, the acceleration (dv/dt) in gs recorded in the drop test) plus 1.0; and

W_e, W, and L are the same as in the drop test computation.

(f) The value of n determined in accordance with paragraph (e) may not be more than the limit inertia load factor used in the landing conditions in § 23.473.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23–7, 34 FR 13091, Aug. 13, 1969; Amdt. 23–48, 61 FR 5148, Feb. 9, 1996]

§ 23.726 Ground load dynamic tests.

(a) If compliance with the ground load requirements of §§ 23.479 through 23.483 is shown dynamically by drop test, one drop test must be conducted that meets § 23.725 except that the drop height must be—

(1) 2.25 times the drop height prescribed in § 23.725(a); or

(2) Sufficient to develop 1.5 times the limit load factor.

(b) The critical landing condition for each of the design conditions specified in §§ 23.479 through 23.483 must be used for proof of strength.

[Amdt. 23–7, 34 FR 13091, Aug. 13, 1969]

§ 23.727 Reserve energy absorption drop test.

(a) If compliance with the reserve energy absorption requirement in § 23.723(b) is shown by free drop tests,